



IB MYP YEAR 5  
ASSESSMENT TASK

# Patterns in Probability

Subject:	Y10 <i>Extended</i> Mathematics	Name: (Class)	( )
Topic:	Patterns in Probability		
Date of assessment:	Thursday 1 <sup>st</sup> December (session 2)		

- This task assesses Criteria B and C
- Time allowed – *one hour*
- Write your answers on the file paper provided. GDCs are allowed.

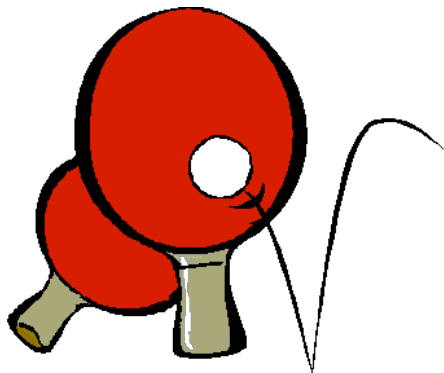
## ADVICE:

Read the criteria descriptors and task-specific clarifications carefully before you start your work. This will give you a clear understanding of what is required and what a high quality piece of work for this task must include. This way you give yourself the best chance of achieving the highest levels in this task.

Criterion B		
Levels	Task-Specific Rubric	Official IB Descriptors
0	The student does not reach a standard described by any of the descriptors given below.	
1-2	You are able to answer the early questions, and order your answers in a way that reveals patterns.	The student <b>applies, with some guidance</b> , mathematical problem-solving techniques to recognize simple patterns.
3-4	You develop appropriate systematic methods in order to answer the questions. The results you get help you to suggest a mathematical rule using a,b and N	The student <b>applies</b> mathematical problem-solving techniques to recognize patterns, <b>and suggests</b> relationships or general rules.
5-6	You continue with the questions, and use questions 6 and 7 as a check on your findings.	The student <b>selects and applies</b> mathematical problem-solving techniques to recognize patterns, <b>describes</b> them as relationships or general rules, and <b>draws conclusions</b> consistent with findings.
7-8	You are able to justify or prove your answer to question 6.	The student <b>selects and applies</b> mathematical problem-solving techniques to recognize patterns, <b>describes</b> them as relationships or general rules, draws the <b>correct conclusions</b> consistent with findings, and <b>provides justifications or a proof</b> .

Criterion C		
Levels	Task-Specific Rubric	Official IB Descriptors
0	The student does not reach a standard described by any of the descriptors given below.	
1-2	The narrative is basic. Mathematical symbols are used, perhaps with <b>some</b> errors or inconsistencies.	The student shows <b>basic use</b> of mathematical language and/or forms of mathematical representation. The lines of reasoning are <b>difficult to follow</b> .
3-4	The narrative is reasonably easy to follow. Mathematical language is used in a generally accurate way. Mathematical notation is used with few errors.	The student shows <b>sufficient use</b> of mathematical language and forms of mathematical representation. The lines of reasoning are <b>clear though not always logical or complete</b> . The student moves between different forms of representation with <b>some success</b> .
5-6	The narrative is easy to follow. Mathematical arguments are presented logically. Mathematical vocabulary and notation are used accurately and appropriately.	The student shows <b>good use</b> of mathematical language <b>and</b> forms of mathematical representation. The lines of reasoning are <b>concise, logical and complete</b> . The student moves <b>effectively</b> between different forms of representation.

# Patterns in Probability



I play table tennis against a friend. The probability I win a point is  $a$  and the probability she wins a point is  $b$ . These probabilities stay constant throughout the game.

**(Note:  $a \neq b$ )**

***A game is won only when a player wins two consecutive points.***

*So, for example, I might win a game where the point rallies go: WLWLWLWLWW (that is, I win the game because I won the final 2 points).*

***In the following, simplify your answers wherever possible.***

1. Write a simple relationship between  $a$  and  $b$ .
2. What is the probability I win the first two points (and so win the game)?
3. What is the probability the game lasts for 3 points and I win?
4. What is the probability the game lasts for 4 points and I win?

*(You may like to repeat question 4 for when the game lasts for 5 points, or 6, or 7 and so on.)*

5. Describe mathematically any patterns you find in these probabilities.
6. What is the probability, in terms of  $a$  and  $b$ , that the game lasts for  $N$  points and I win?
7. If  $a = 0.6$ , show that the probability I win a game in 5 points or less is approximately 0.625.
8. Write a ***proof*** or ***justification*** of your answer to question 6.